

Date: June 3, 2013

To: Thomas J. Bonfield, City Manager

Through: W. Bowman Ferguson, Deputy City Manager

From: Donald F. Greeley, Director, Water Management

Subject: Ellerbe Creek Aerial Sewer Crossing Replacement Project – Change Order #1

Executive Summary

On December 3, 2012, City Council awarded the Ellerbe Creek Aerial Sewer Crossing Replacement Project to Crowder Construction Company. The original project scope consisted of replacing approximately 80 feet of concrete piers and steel beams that support two 30-inch gravity sewer lines over Ellerbe Creek near the North Durham Water Reclamation Facility (NDWRF). A temporary emergency repair of a failing pier was made in 2011. This project is the permanent solution to the failing pier system, where the two sets of piers are being replaced with one simply-supported steel truss spanning Ellerbe Creek.

The two 30-inch mains transport approximately 4 million gallons per day (MGD) of sewage to the NDWRF. This is about 50% of the current NDWRF flow and 25% of the City's total flow.

Because bypass pumping was needed for the project, Department of Water Management (DWM) staff used the opportunity to clean and inspect the lines for potential line/rehabilitation of the interior of the mains with cured-in-place pipe (CIPP). The interior cleaning exposed many corroded portions of the ductile iron mains. Also, at locations of minimum wall thicknesses, pressurized water from the cleaning operation punctured through the pipe walls.

Due to the conditions revealed, DWM staff recommends against lining/rehabilitating the mains and instead proposes replacing them with a new ductile iron system with interior corrosion protection. This is the basis of this change order, which also includes the following items:

- adds the replacement of 250 feet of 30-inch pipe with 250 feet of 42-inch pipe
- modifies the steel truss to carry a single 42-inch main
- demolishes one manhole and a large concrete junction box
- adds one manhole
- adds 80 days to the project.

The DWM recommends the City of Durham authorize the addition of \$1,134,279.57 to the contract by the approval of Change Order #1.

Recommendations

The Department of Water Management recommends that the City Council:

1. Authorize the City Manager to execute Change Order #1 with Crowder Construction Company for the Ellerbe Creek Aerial Sewer Crossing Replacement Project, SRM-2EA, provide the change order does not to exceed \$1,134,279.57; and,

2. Authorize the City Manager or his designee to negotiate and execute change orders to the contract provided that the total cost of all change orders does not exceed the project cost of \$2,338,279.57, plus the established contingency fund of \$116,000.00.

Background

The City of Durham Department of Water Management owns and operates a gravity sewer collection system that feeds NDWRF. Several of these gravity sewer lines combine into two 30-inch gravity sewer lines that run parallel to Club Boulevard and enter NDWRF on the west side. The two 30-inch gravity sewer lines cross Ellerbe Creek enroute to NDWRF by an 80 foot long aerial crossing and are supported on piers and steel beams.

The original contract scope included removal of the existing piers and beams and replacing them with a steel truss capable of withstanding significant storm events. The original scope also included cleaning the existing lines and assessing their condition using CCTV technology. The interior cleaning exposed many corroded portions of the ductile iron mains. Also, at locations of minimum wall thicknesses, pressurized water from the cleaning operation punctured through the pipe walls.

To further assess the condition of the existing sewer pipes, ultrasonic thickness testing of above ground pipes was performed. The testing indicates that deterioration of the remaining above-ground 42" sewer pipe has also occurred, and it is likely that the below-ground reaches are in the same condition. Based on this testing and analysis, full replacement of the gravity sewer pipe is deemed necessary.

The original contract scope also included the cleaning and assessment of the junction box where the two existing 30-inch gravity lines combine in to one 42" pipe. The junction box was cleaned and inspected which revealed significant deterioration of concrete. In some places, the concrete was eroded down to the existing rebar, exposing the steel reinforcing to the raw sewage which accelerated erosion of the steel.

Change Order 1 to the existing contract will remove both 30-inch gravity sewer lines and replace them with one 42" gravity sewer line. The existing junction box will be demolished and properly disposed of and replaced with a new junction box on the other side of the stream crossing. The original steel superstructure design will be retained but modified to accommodate one 42" gravity sewer line instead of two 30-inch gravity sewer lines.

Issues and Analysis

The Sewer mains that transport approximately 4 MGD over Ellerbe Creek to the NDWRF have been found to be deteriorated to a point where immediate replacement is required. A contractor working on the Ellerbe Aerial Crossing replacement is currently onsite with a 20-MGD bypass pumping operation in place. The 20-MGD bypass pumping operation, per the project's specifications, is sized to handle peak (wet weather) conditions in the two 30-inch mains.

The project's time and the bypass pumping have been extended beyond the original schedule date of July 9th, 2013 to accommodate emergency design, procurement, and construction of a replacement gravity system and modified truss system over Ellerbe Creek. The bypass pumping operation alone costs \$21,699.00 per week.

Because of the costs of extending project time as well as the extreme deterioration present, it is deemed imperative to complete the project as quickly as possible. However, due the proximity of Ellerbe Creek and the magnitude of flow associated with the project, it is equally critical to proceed methodically with the sequencing of work, final designs, and construction.

DWM staff, the Engineer, and the Contractor communicate several times daily to discuss schedules, costs, and next steps. A final design has recently been approved for the gravity system and modified truss. The Contractor, DWM, and Engineer have negotiated construction costs of the final design.

The truss modifications are currently being made. New piping, manholes, and materials are being procured and will be paid for under existing contract dollars. The Contractor has installed the trusses and piles, one on each side of Ellerbe Creek. Upon approval of the Change Order, the truss, piping and manholes will be scheduled to arrive in approximately 3 weeks.

Detailed information on the Change Order Costs is included as Attachment A – PCO 004 Interceptor Replacement and Attachment B - PCO 005 Bypass Pumping Weekly Costs. These costs are summarized as follows:

| Description | Cost |
|---|----------------|
| Concrete Work (Bid Item 20 – Attachment A) | \$132,210.00 |
| Manhole Installation and Junction Box Prep, Demolition of Existing Pipe and Manholes (Bid Item 30 – Attachment A) | \$169,156.00 |
| Pipe Installation (Bid Item 40, Attachment A) | \$184,622.00 |
| Miscellaneous Mobilization and Overhead (Bid Items 10 and 99999, Attachment A) | \$160,239.00 |
| Bypass Pumping (Attachment B)* | \$488,052.57 |
| Total: | \$1,134,279.57 |

*Represents a conservative estimate of how long Bypass Pumping will be required. If the project is expedited, these costs will decrease.

These costs are within 10% of the Engineer’s Estimate when bid variability is included for the construction cost of this project with the Change Order scope included in the original scope. These costs also include a significant credit for scope that has been eliminated from the original scope by the proposed Change Order.

Alternatives

Failure to complete the recommended repair will likely result in the failure of a major sanitary sewer line. Should such a failure occur, the City would be in violation of its Collection System Permit and subject to significant fines from the State and/or the Environmental Protection Agency.

An alternative may be to re-bid the contract with the Change Order work included in the scope. Re-bidding the project would likely require disruption of the existing bypass pumping operations and potentially threaten the health and safety of persons and property. Although the scope of the Changer Order is expansive and was not planned, it is directly related to the original scope of work and considered an emergency repair, which does not require re-bidding.. As the Contractor is currently onsite with an already-mobilized bypass system, there would not be any significant cost savings by taking this approach.

Another alternative would be to line the existing pipe with a protective liner, terminate the existing contract, de-mobilize the existing bypass pumping and re-bid the contract with the Change Order work included in the scope. The protective liners currently available for pipes of this size are not designed for this type of installation, and are not recommended. The protective lining would ultimately be removed once the new contract is awarded, making this alternative significantly more expensive than the proposed Change Order.

Financial Impacts

Funds for this project are available in the Capital Improvements Program, Sewer Collection System Rehabilitation, in the following accounts:

4100P767 731000 P280L \$1,134,279.57

SDBE Summary

This is an amendment to the Ellerbe Creek Aerial Sewer Crossing Replacement Project. Crowder Construction Company, Charlotte, North Carolina will subcontract with the following firms for work in this amendment.

| Firm | ID | City/State | Amount | % of Contract |
|---------------------------------|-----------|-------------------|---------------|----------------------|
| Abram Construction Inc. * | MBE | Charlotte, NC | \$300,000 | 26% |
| Carolina Management Team, LLC** | WBE | Enka, NC | \$ 23,065 | 2% |
| Mayo Transport Inc.** | WBE | Roxboro, NC | \$8,150 | 0.7% |
| CES Group Engineers, LLP** | WBE | Denver, NC | \$2,300 | 0.2% |

*Abram Construction Inc. is a certified DBE and MBE firm with the North Carolina Department of Transportation and was previously used to meet the minority goal for this project.

**Carolina Management Team, LLC, Mayo Transport Inc. and CES Group Engineers, LLP are certified as DBE and WBE firms with the North Carolina Department of Transportation and were previously used to meet the women goal for this project.